Doc.
IP
363.2332
Ai71x

air speed check

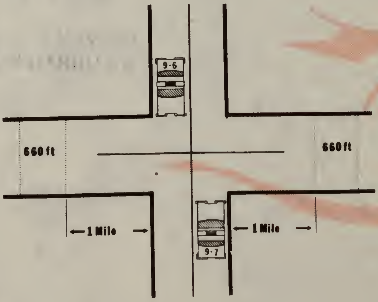
Illinois State Police

DEPOSITORY
MAY 15 1984
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Since November 1, 1959, the Illinois State Police Air Speed Check has been in operation. In order that it be possible to determine a motor vehicle's speed from the vantage point of a low-flying aircraft, some method of obtaining a time-distance relationship was necessary.

It is reasonable to assume that at least one of the factors to be considered must remain constant. The most feasible choice therefore is the distance measurement on the highway itself, since it could be accurately measured and painted so that it would be readily identifiable from State Police aircraft. One-eighth mile or 660 feet, was chosen since it had been previously tried and proven in at least one other state and appeared to be satisfactory for the highway system of the State of Illinois.

The time factor then became the variable to be measured in determining the average speed of the vehicle as it travels through a measured one-eighth mile distance. This is accomplished by measuring the time interval, in seconds and tenths, that the vehicle required to traverse the 660 feet.



Example: If a vehicle took exactly five (5) seconds to traverse the measured constant upon the highway, this variable is then the divisor, thus $5\overline{)}$. The dividend is the one-eighth mile constant, thus $\overline{)\,660,}$ the quotient of this arthmetic exercise then is the actual speed of the vehicle in feet per second, thus:

$$\begin{array}{l} \quad 132 \text{ feet per second} \\ 5\overline{)\,660} \end{array}$$

This figure is then multiplied by the number of seconds in as hour, thus:

$$\begin{array}{rl} 132 & \text{feet per second} \\ \underline{3600} & \text{seconds in an hour} \\ 79200 & \\ \underline{396} & \\ 475200 & \text{feet per hour} \end{array}$$

It has been establsihed that the speed of the instant vehicle through the measured zone, is 475,200 feet per hour. There remains but to divide the product by the number of feet in a mile to arrive at the actual speed in miles per hour, thus:

$$\begin{array}{r} 90.00 \\ 5280\overline{)\,475{,}200.00} \\ 475{,}20 \end{array}$$

The speed of the vehicle traversing this measured distance in exactly five (5) seconds is 90 miles per hour.

Conclusion:

Based on tests that have been conducted the following conclusions can be made:

1. It is possible to calculated the average speeds of motor vehicles over an eighth-mile distance from an observation plane with an average error of but one percent in miles per hour.

2. It is reasonable to assume that a vehicle speed calculated on a time and space interval relationship, such as described, can determine actual ground speed with maximum accuracies.

Partial time-speed relationship table as measured over a 660 foot course:

Time (seconds)	Speed (MPH)
4.0	112.50
4.5	100.00
5.0	90.00
5.5	81.82
6.0	75.00
6.5	69.23
7.0	64.28
7.5	60.00
8.0	56.22
8.5	52.94
9.0	50.00

UNIVERSITY OF ILLINOIS-URBANA
3 0112 118489993

DEPARTMENT OF LAW ENFORCEMENT
Printed by the Authority of the State of Illinois
30 M 7-80

ILLINOIS STATE POLICE